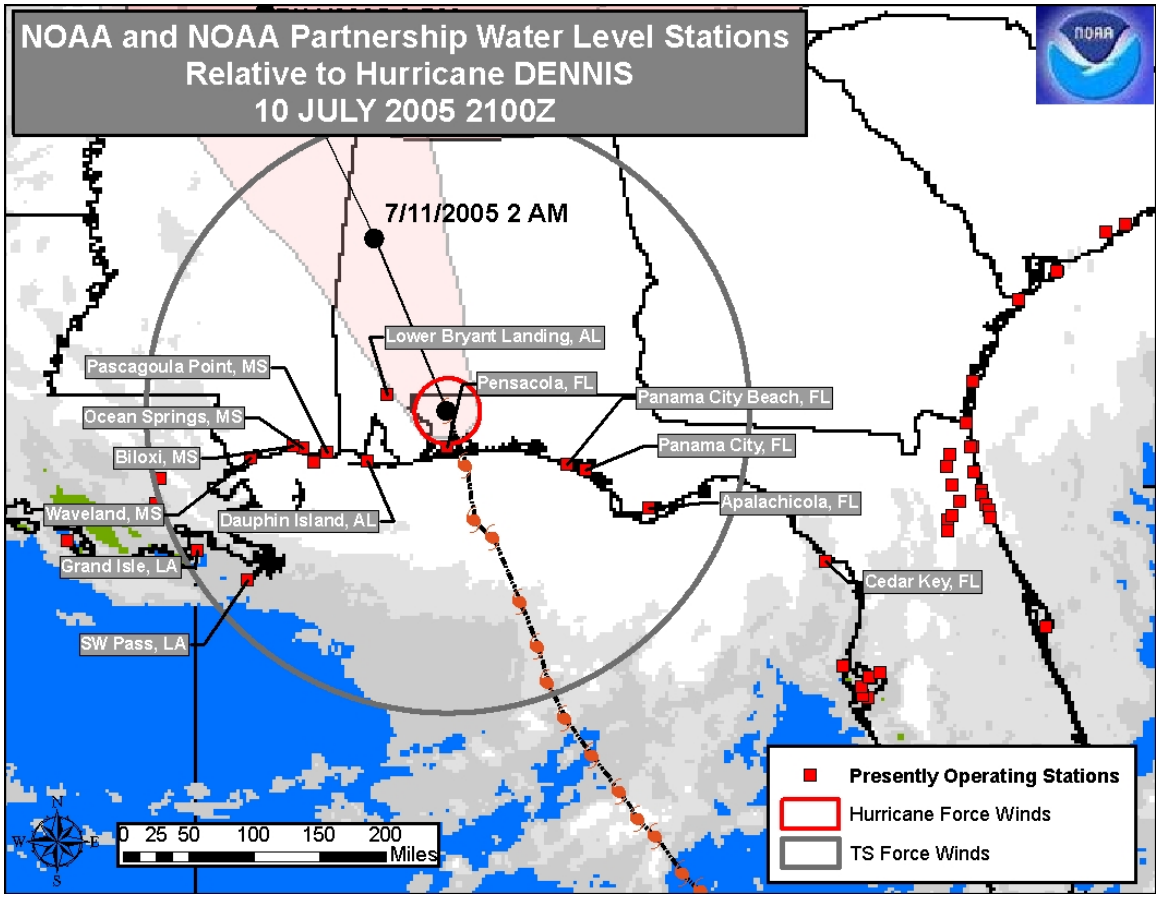
Preliminary Report

Hurricane DENNIS storm tide summary



July 2005

noaa National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF COMMERCE
National Ocean Service
Center for Operational Oceanographic Products and Services

SUMMARY

Hurricane Dennis made landfall near Pensacola, FL as Category 3 Hurricane on 10 July @ 4:00pm EDT. At the time of landfall maximum sustained winds were near 105 mph and the minimum central pressure was 950 MB. Water level stations from Key West, FL to Southwest Pass, LA were impacted by Hurricane Dennis.

Apalachicola, FL recorded the highest storm tide of 2.452m (8.05ft) above MLLW. Cedar Key, FL recorded 2.373m (7.79 ft); Panama City Beach, FL recorded 2.070m (6.79 ft); Panama City, FL recorded 1.703m (5.59 ft).

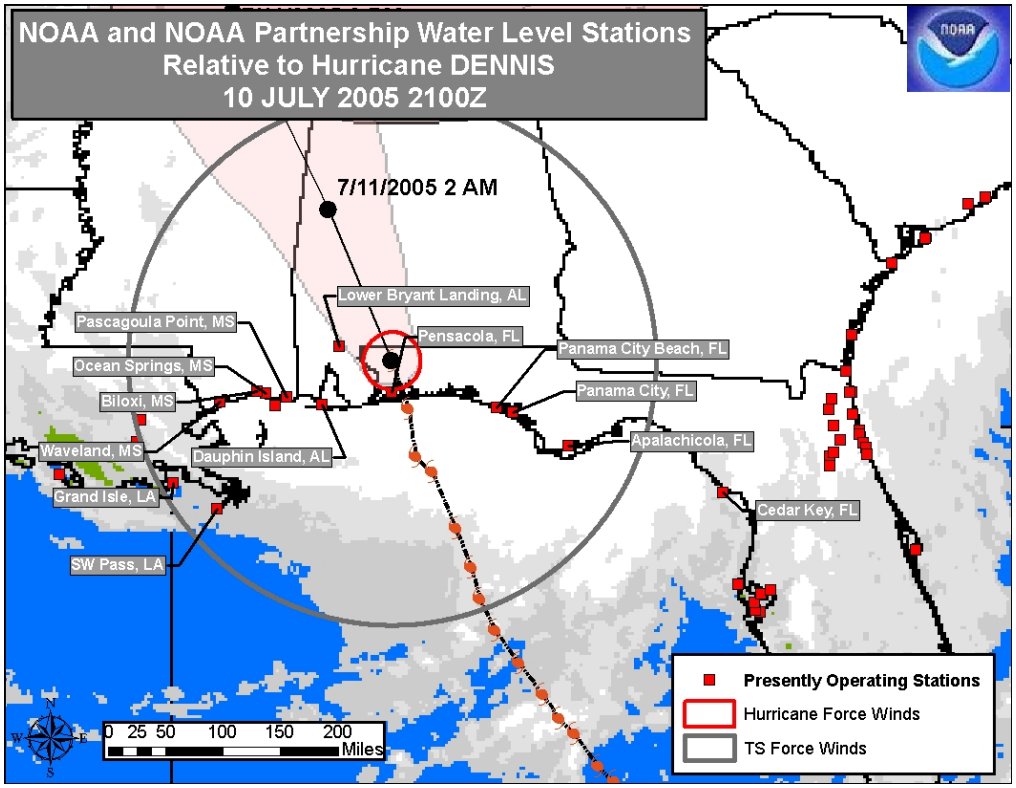


Figure 1. Hurricane Dennis made landfall near Pensacola, FL and continued north through Alabama on 10 July 05.

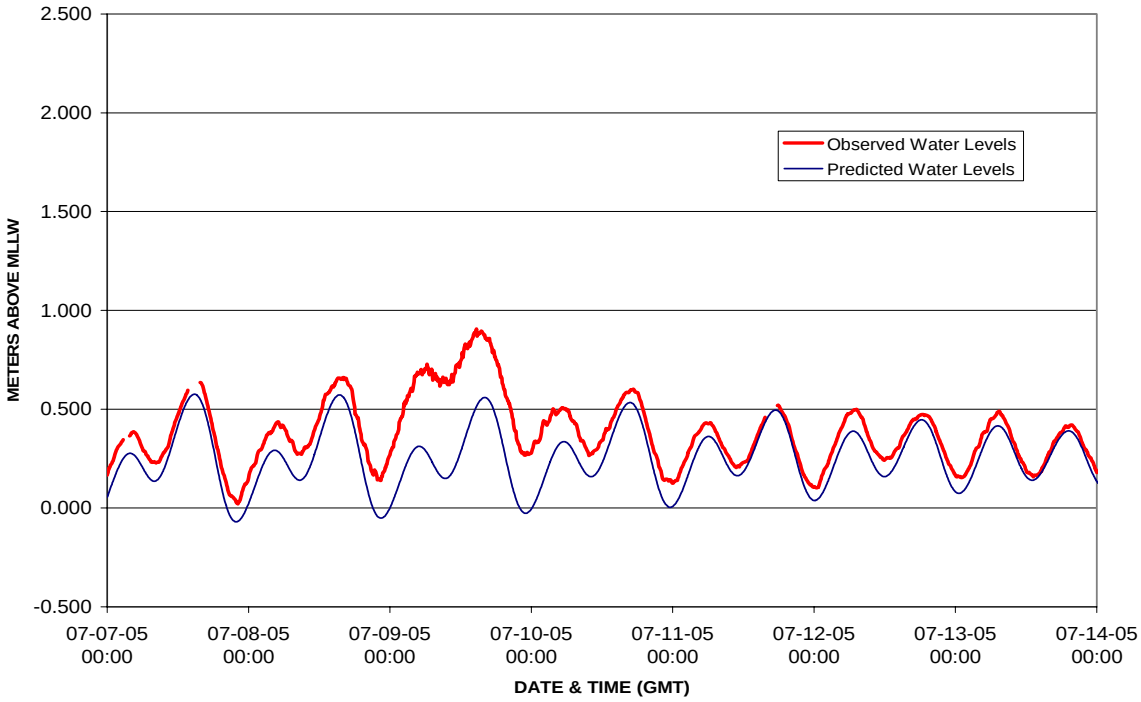
Table 1. Storm Tide Summary for Hurricane Dennis.

Station Name	Station ID	Latitude	Longitude	Date/Time GMT	Max Water Level above MLLW Storm Tide (m)	Predicted Water Levels (m)	Difference (m)	Max Water Level above MLLW Storm Tide (ft)	Predicted Water Levels (ft)	Difference (ft)
Key West, FL	8724580	24 33.2 N	81 48.5 W	07-09-05 14:42	0.906	0.514	0.392	2.97	1.69	1.29
Naples, FL	8725110	26 7.8 N	81 48.4 W	07-10-05 05:12	1.297	0.483	0.814	4.26	1.59	2.67
Fort Myers, FL	8725520	26 38. 8 N	81 52. 3 W	07-10-05 08:54	0.974	0.147	0.827	3.20	0.48	2.71
Cedar Key, FL	8727520	29 8.1 N	83 1.9 W	07-10-05 17:54	2.373	0.919	1.454	7.79	3.02	4.77
Clearwater, FL	8726724	27 58.7 N	82 49.9 W	07-10-05 11:48	1.569	0.387	1.182	5.15	1.27	3.88
McKay Bay Entrance, FL	8726667	27 54.8 N	82 25.5 W	07-10-05 13:54	1.475	0.442	1.033	4.84	1.45	3.39
Apalachicola, FL	8728690	29 43.6 N	84 58.9 W	07-10-05 18:42	2.452	0.361	2.091	8.05	1.18	6.86
Panama City, FL	8729108	30 9.1 N	85 40.0 W	07-10-05 21:24	1.703	0.326	1.377	5.59	1.07	4.52
Panama City Beach, FL	8729210	30 12.8 N	85 52.7 W	07-10-05 19:18	2.070	0.366	1.704	6.79	1.20	5.59
Pensacola, FL	8729840	30 24.2 N	87 12.7 W	07-10-05 19:54	1.682	0.413	1.269	5.52	1.36	1.27
Dauphin Island, AL	8735180	30 15.0 N	88 4.5 W	07-10-05 19:06	1.089	0.354	0.735	3.57	1.16	2.41
Ocean Springs, MS	8743281	30 23.5 N	88 47.9 W	07-10-05 14:12	0.999	0.339	0.66	3.28	1.11	2.16
Waveland, MS	8747766	30 16.9 N	89 22.0 W	07-10-05 14:54	0.956	0.378	0.578	4.00	0.77	3.22
Biloxi, MS	8744117	30 24.7 N	88 54.2 W	07-10-05 14:18	1.024	0.344	0.68	3.36	1.13	2.23
Grand Isle, LA	8761724	29 15.8 N	89 57.4 W	07-11-05 17:36	0.613	0.293	0.320	2.01	0.96	1.05
Southwest Pass, LA	8760922	28 55.9 N	89 24.4 W	07-10-05 17:00	0.774	0.381	0.393	2.54	1.25	1.29

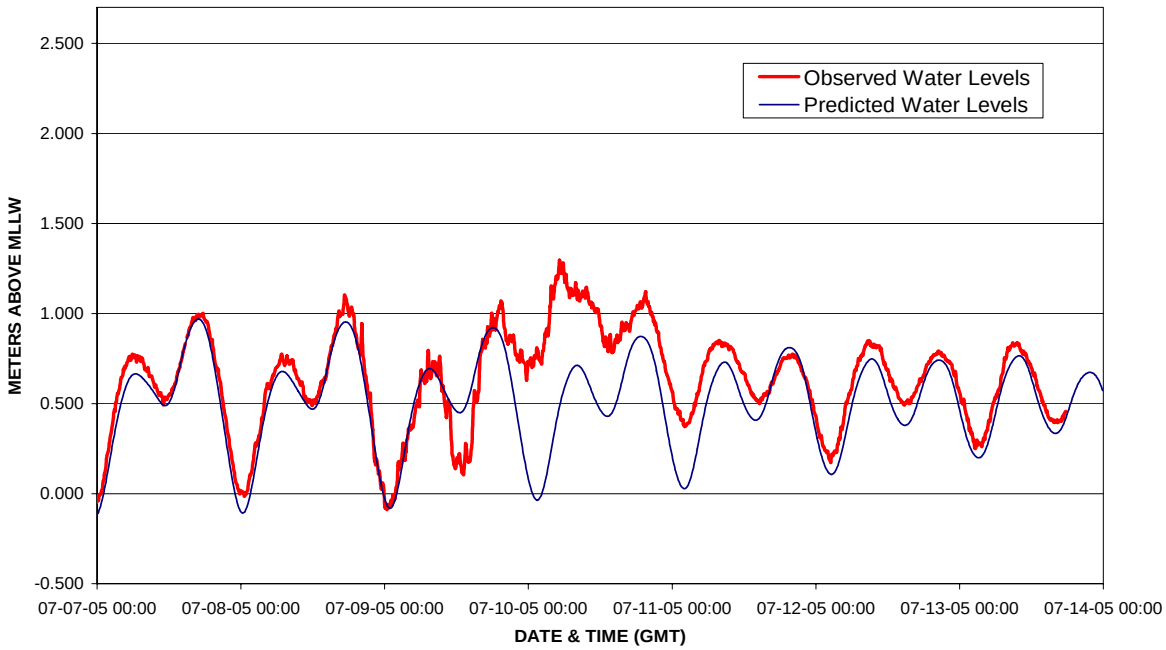
NOTE : Ocean Springs, MS Storm Tide Value is based on predictions from a nearby station and is subject to NOS verification.

STORM TIDE water levels obtained from direct observation of actual water levels above MLLW datum.

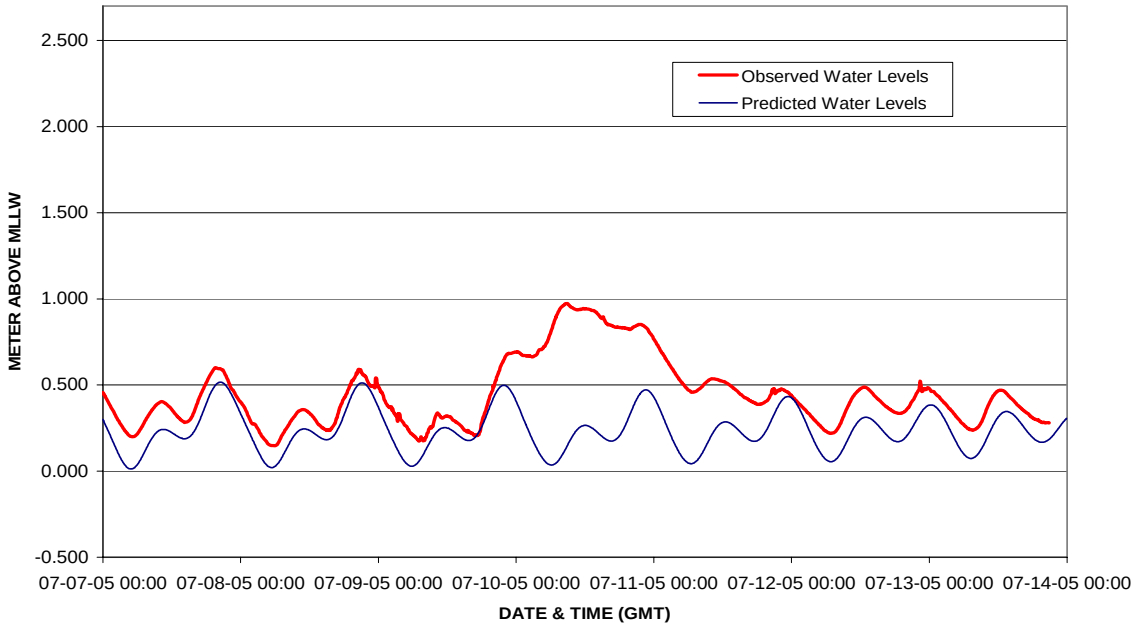
OBSERVED VS PREDICTED WATER LEVELS
8724580 KEY WEST FL
STORM TIDE 0.906m (2.97 ft) 07-09-05 @ 14:42 GMT



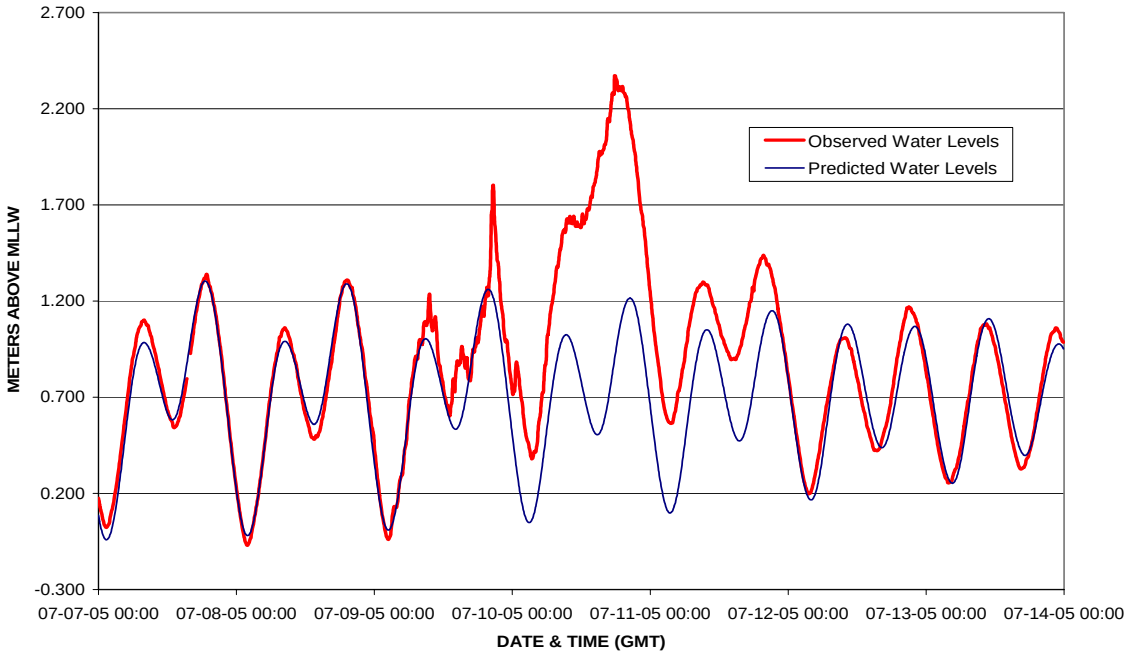
OBSERVED VS PREDICTED WATER LEVELS
8725110 NAPLES, GULF OF MEXICO FL
STORM TIDE 1.297 m (4.26 ft) 07-10-05 @ 05:12 GMT

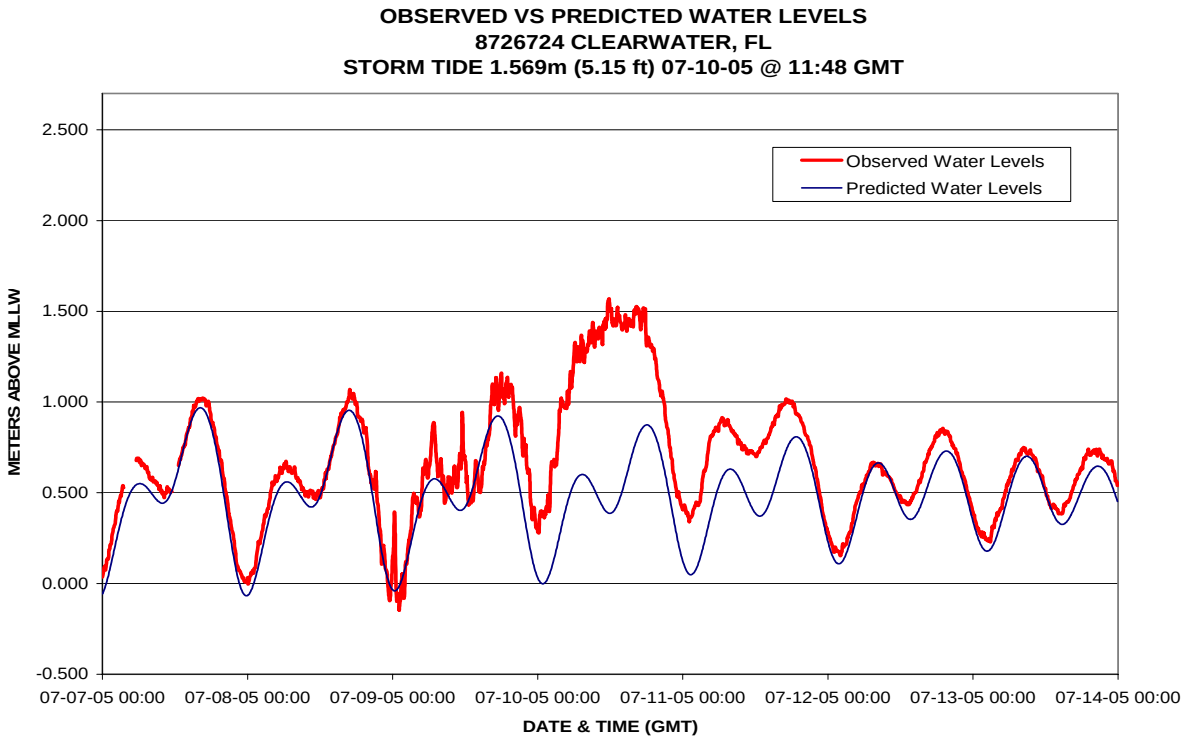


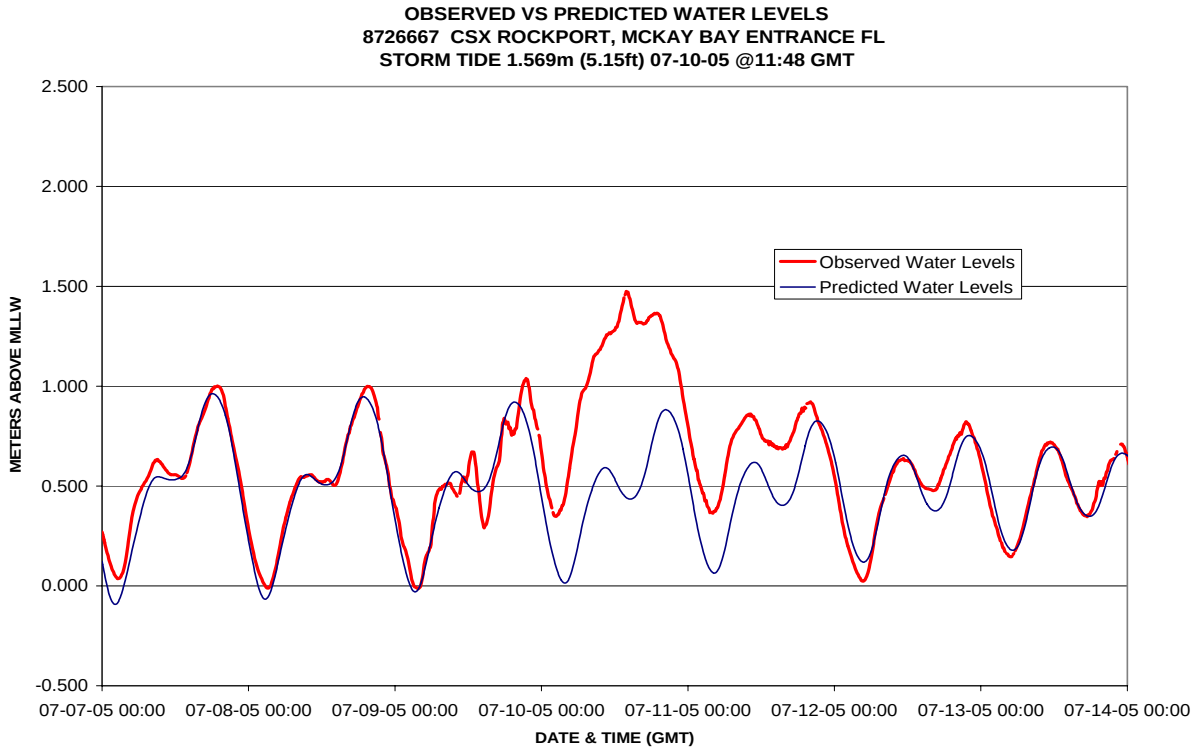
OBSERVED VS PREDICTED WATER LEVELS
8725520 FORT MYERS, FL
STORM TIDE 0.974m (3.20 ft) 07-10-05 @ 08:54 GMT

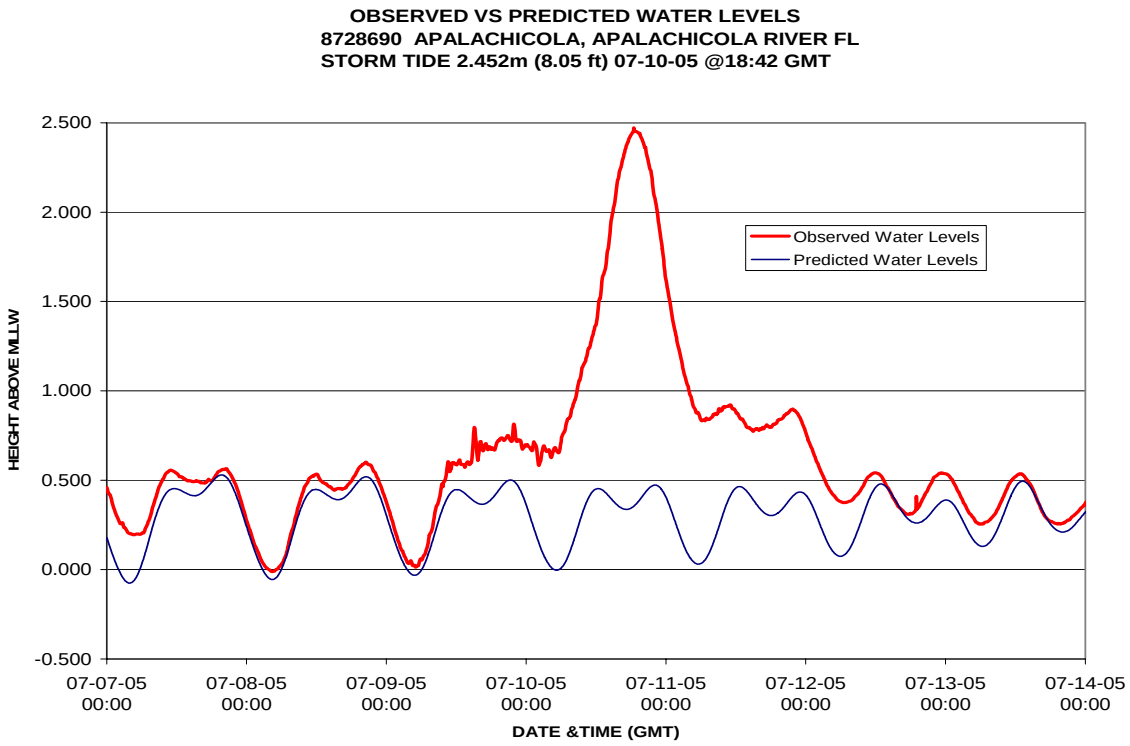


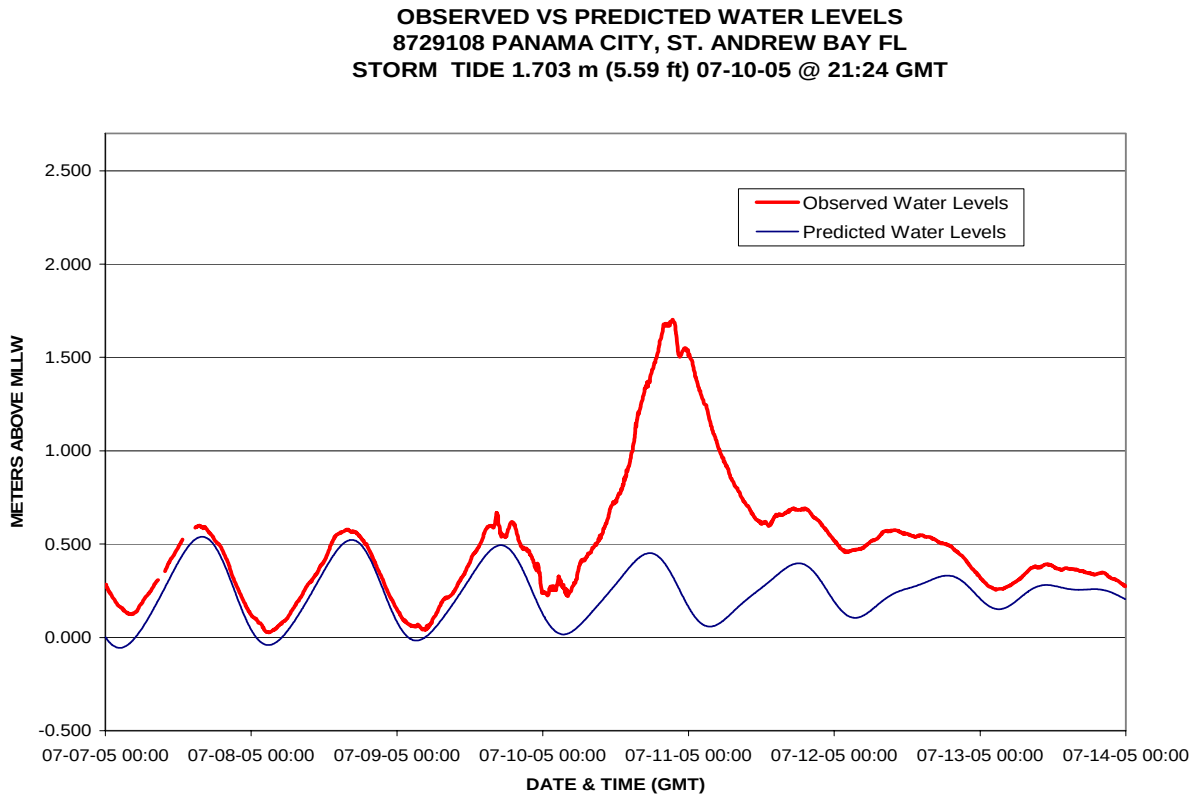
OBSERVED VS PREDICTED WATER LEVELS
8727520 CEDAR KEY, FL
STORM TIDE 2.373m (7.79 ft) 07-10-05 @17:54



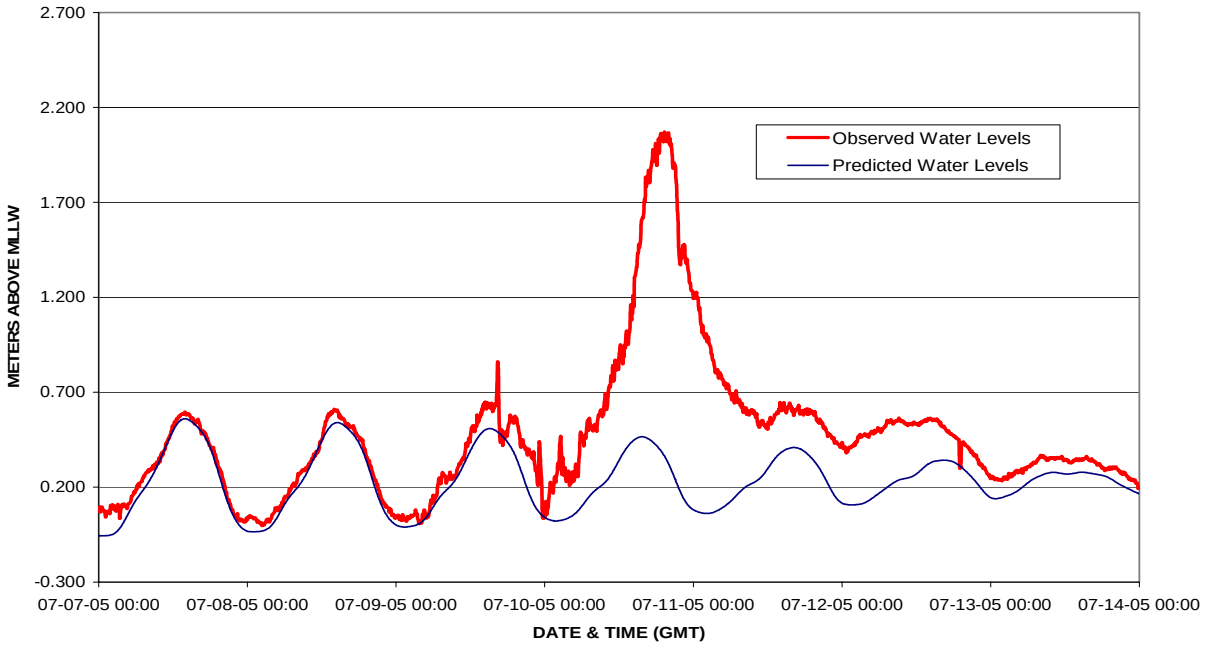

OBSERVED VS PREDICTED WATER LEVELS
8726724 CLEARWATER, FL
STORM TIDE 1.569m (5.15 ft) 07-10-05 @ 11:48 GMT
Observed Water Levels
Predicted Water Levels
METERS ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
07-13-05 00:00
07-14-05 00:00
DATE & TIME (GMT)


OBSERVED VS PREDICTED WATER LEVELS
8726667 CSX ROCKPORT, MCKAY BAY ENTRANCE FL
STORM TIDE 1.569m (5.15ft) 07-10-05 @11:48 GMT
Observed Water Levels
Predicted Water Levels
METERS ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
07-13-05 00:00
07-14-05 00:00
DATE & TIME (GMT)

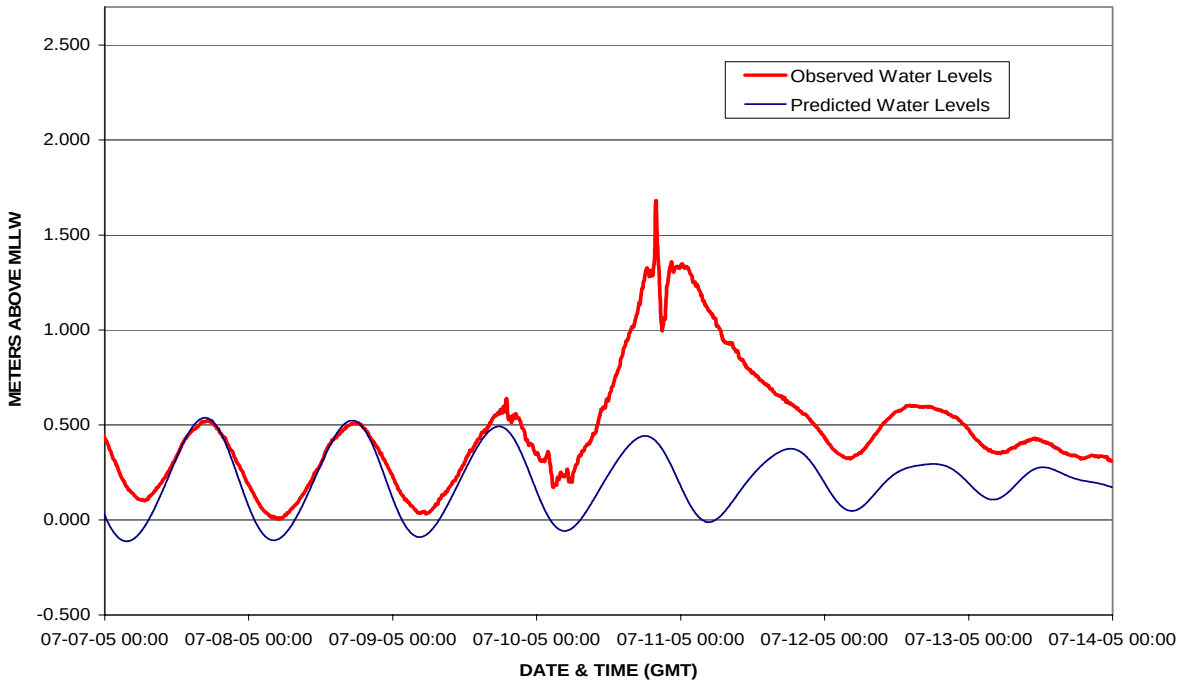

OBSERVED VS PREDICTED WATER LEVELS
8728690 APALACHICOLA, APALACHICOLA RIVER FL
STORM TIDE 2.452m (8.05 ft) 07-10-05 @18:42 GMT
HEIGHT ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
Observed Water Levels
Predicted Water Levels
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
07-13-05 00:00
07-14-05 00:00
DATE &TIME (GMT)


OBSERVED VS PREDICTED WATER LEVELS
8729108 PANAMA CITY, ST. ANDREW BAY FL
STORM TIDE 1.703 m (5.59 ft) 07-10-05 @ 21:24 GMT
METERS ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
Observed Water Levels
Predicted Water Levels
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
07-13-05 00:00
07-14-05 00:00
DATE & TIME (GMT)

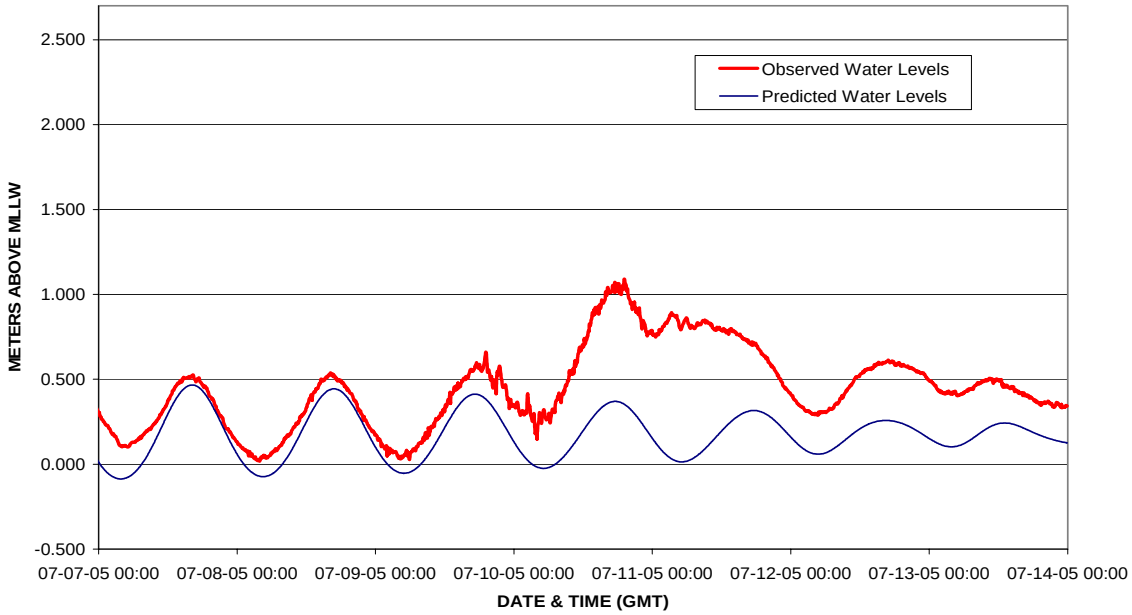
OBSERVED VS PREDICTED WATER LEVELS
8729210 PANAMA CITY BEACH, GULF OF MEXICO FL
STORM TIDE 2.070 m (6.79 ft) 07-10-05 @ 19:18 GMT



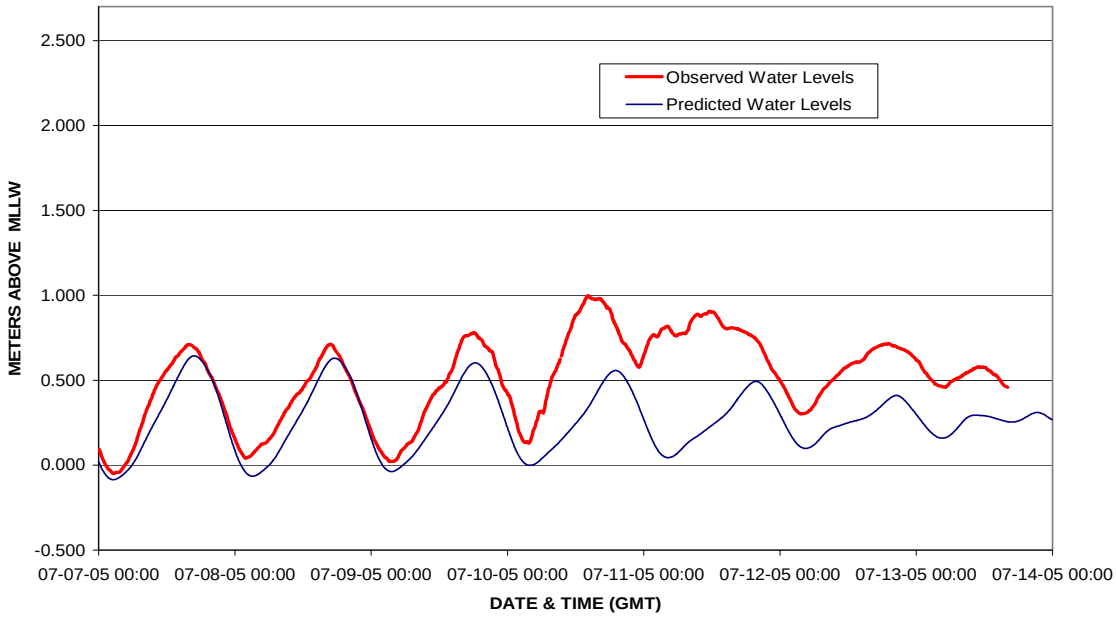
OBSERVED VS PREDICTED WATER LEVELS
8729840 PENSACOLA, FL
STORM TIDE 1.682m (5.52 ft) 07-10-05 @ 19:54 GMT

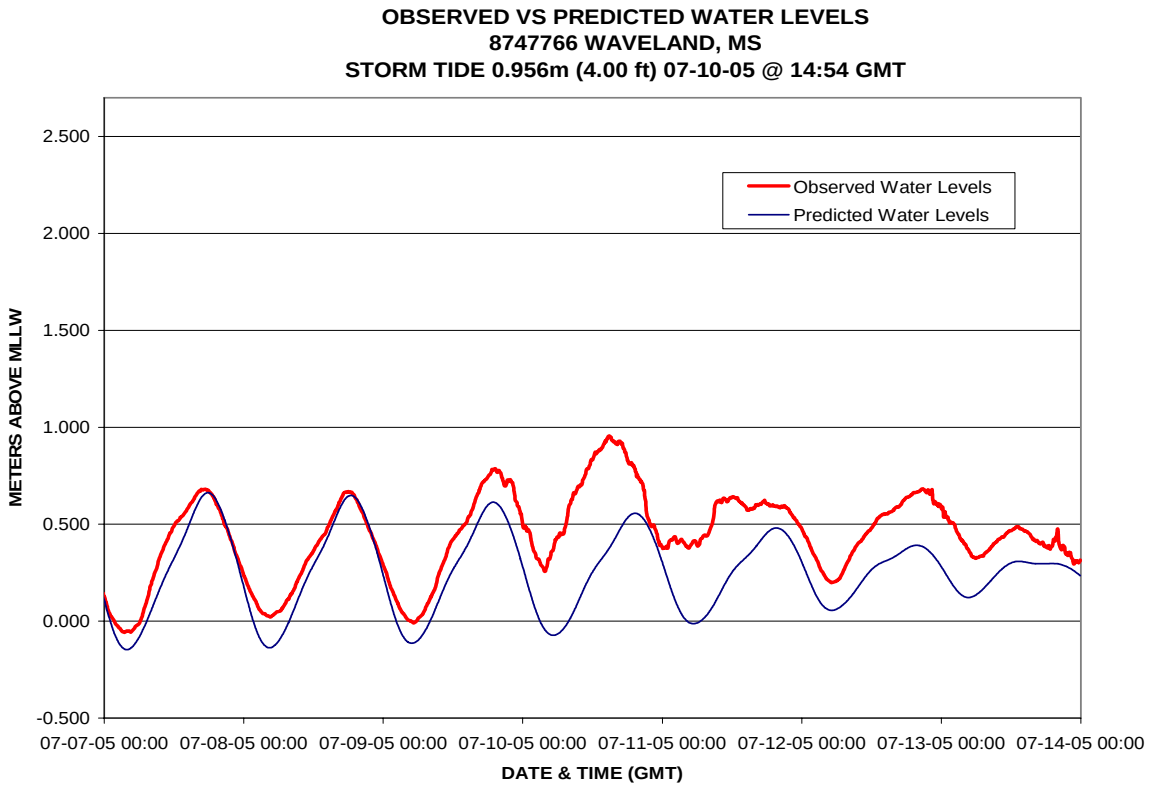


OBSERVED VS PREDICTED WATER LEVELS
8735180 DAUPHIN ISLAND, AL
STORM TIDE 1.089m (3.57 ft) 07-10-05 @ 19:06 GMT



OBSERVED VS PREDICTED WATER LEVELS
8743281 OCEAN SPRINGS, MS
STORM TIDE 0.999m (3.28 ft) 07-10-05 @14:12




OBSERVED VS PREDICTED WATER LEVELS
8747766 WAVELAND, MS
STORM TIDE 0.956m (4.00 ft) 07-10-05 @ 14:54 GMT
Observed Water Levels
Predicted Water Levels
METERS ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
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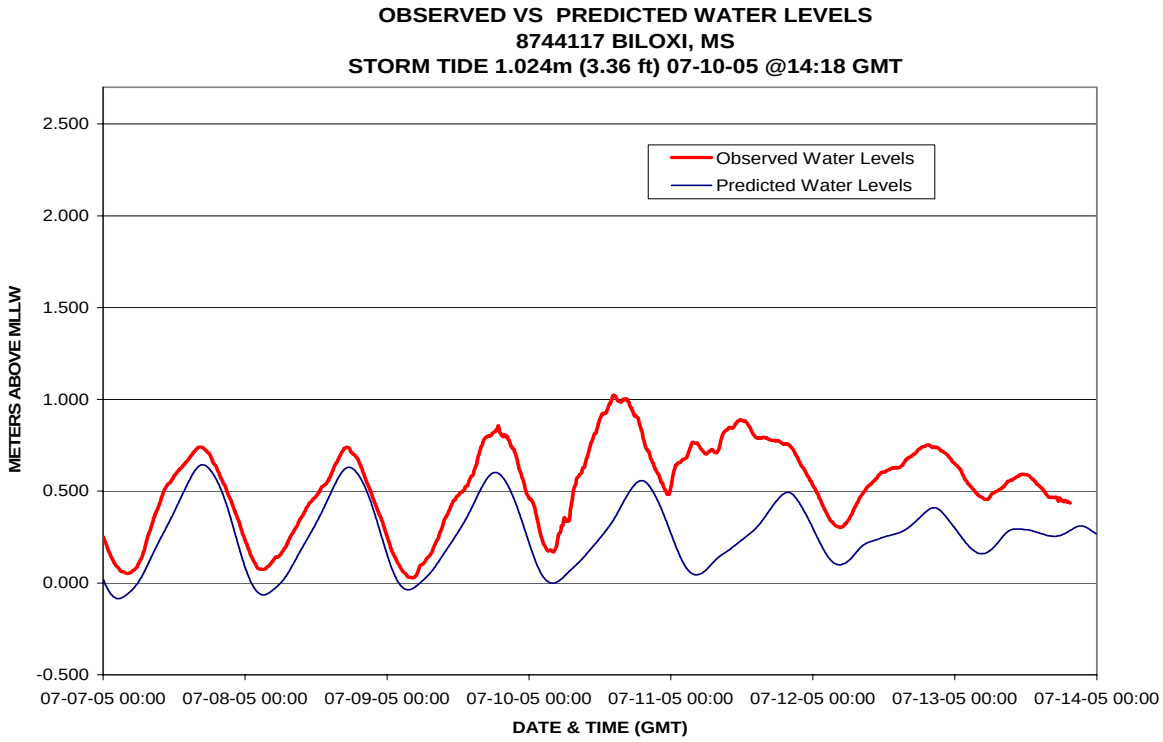
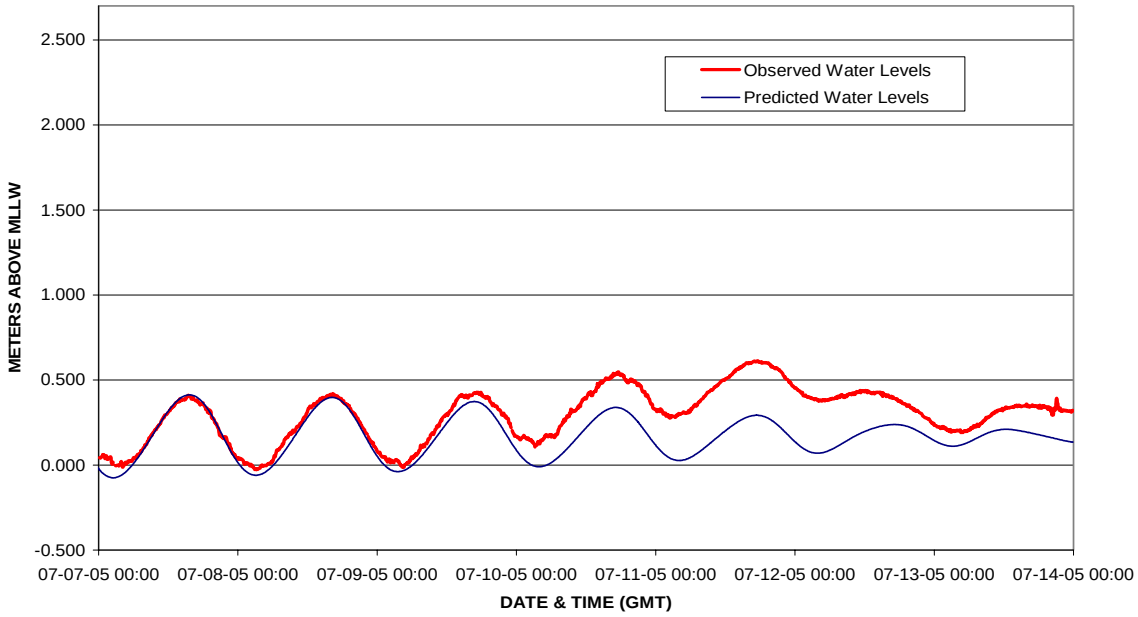
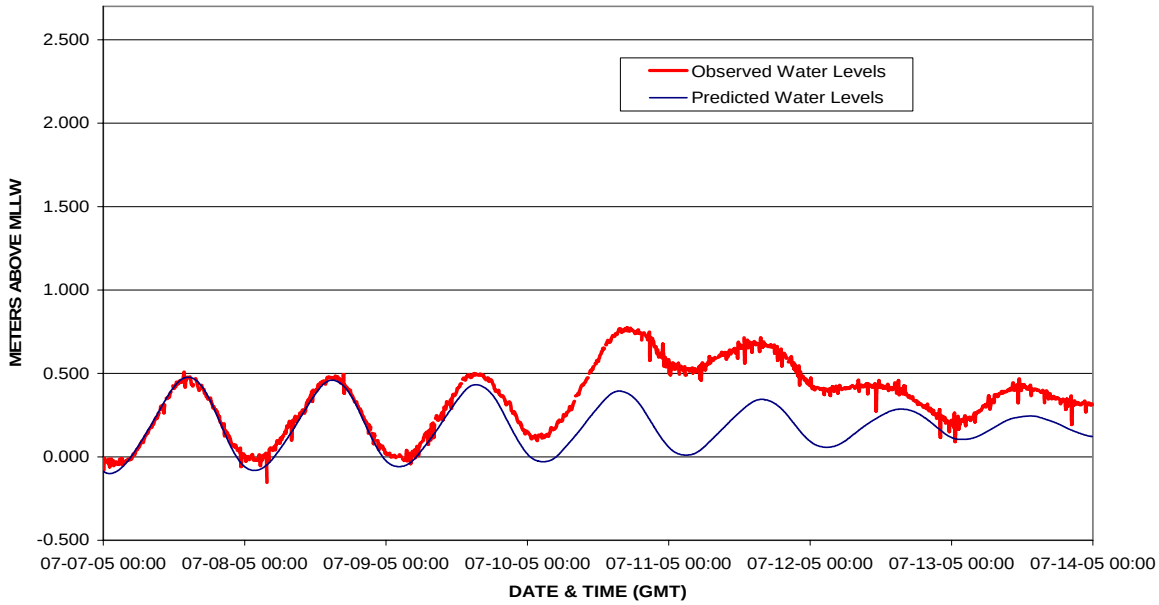
07-14-05 00:00
DATE & TIME (GMT)


OBSERVED VS PREDICTED WATER LEVELS
8744117 BILOXI, MS
STORM TIDE 1.024m (3.36 ft) 07-10-05 @14:18 GMT
Observed Water Levels
Predicted Water Levels
METERS ABOVE MLLW
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
07-07-05 00:00
07-08-05 00:00
07-09-05 00:00
07-10-05 00:00
07-11-05 00:00
07-12-05 00:00
07-13-05 00:00
07-14-05 00:00
DATE & TIME (GMT)

OBSERVED VS PREDICTED WATER LEVELS
8761724 GRAND ISLE, LA
STORM TIDE 0.613m (2.01 ft) 07-11-05 @ 17:36 GMT



OBSERVED VS PREDICTED WATER LEVELS
8760922 SOUTHWEST PASS, LA
STORM TIDE 0.774m (2.54 ft) 07-10-05 @ 17:00 GMT



Appendix 2

Excerpt From:

Tide and Current Glossary, NOAA National Ocean Service, Silver Spring, MD, 2000.

tide: The periodic rise and fall of a body of water resulting from gravitational interactions between Sun, Moon, and Earth. The vertical component of the particulate motion of a tidal wave. Although the accompanying horizontal movement of the water is part of the same phenomenon, it is preferable to designate this motion as tidal current. Same as astronomic tide.

tide (water level) gauge: An instrument for measuring the rise and fall of the tide (water level).

storm tide: As used by the National Weather Service, NOAA, the sum of the storm surge and astronomic tide. See storm surge and tide.

storm surge: The local change in the elevation of the ocean along a shore due to a storm. The storm surge is measured by subtracting the astronomic tidal elevation from the total elevation. It typically has a duration of a few hours. Since wind generated waves ride on top of the storm surge (and are not included in the definition), the total instantaneous elevation may greatly exceed the predicted storm surge plus astronomic tide. It is potentially catastrophic, especially on low lying coasts with gently sloping offshore topography. See storm tide.

National Water Level Observation Network (NWLON): The network of tide and water level stations operated by the National Ocean Service along the marine and Great Lakes coasts and islands of the United States.

datum (vertical): For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. Tidal datums are local datums and should not be extended into areas which have differing hydrographic characteristics without substantiating measurements. In order that they may be recovered when needed, such datums are referenced to fixed points known as bench marks. See chart datum and bench marks.

chart datum: The datum to which soundings on a chart are referred. It is usually taken to correspond to a low-water elevation, and its depression below mean sea level is represented by the symbol Z_0. Since 1980, chart datum has been implemented to mean lower low water for all marine waters of the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands. See datum and National Tidal Datum Convention of 1980.

geodetic datum: See National Geodetic Vertical Datum of 1929 (NGVD 1929) and North American Vertical Datum of 1988 (NAVD 1988).

Mean Lower Low Water (MLLW): A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. See National Tidal Datum Epoch. For stations with shorter series, comparison of simultaneous observations with a control tide station is made in order to derive the equivalent datum of the National Tidal Datum Epoch.

National Tidal Datum Epoch: The specific l9-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (e.g., mean lower low water, etc.) for tidal datums. It is necessary for standardization because of periodic and apparent secular trends in sea level. The present National Tidal Datum Epoch is 1960 through 1978. It is reviewed annually for possible revision and must be actively considered for revision every 25 years.

National Tidal Datum Convention of 1980: Effective November 28, 1980, the Convention: (1) establishes one uniform, continuous tidal datum system for all marine waters of the United States, its territories, Commonwealth of Puerto Rico, and Trust Territory of the Pacific Islands, for the first time in history; (2) provides a tidal datum system independent of computations based on type of tide; (3) lowers chart datum from mean low water to mean lower low water along the Atlantic coast of the United States; (4) updates the National Tidal Datum Epoch from 1941 through 1959, to 1960 through 1978; (5) changes the name Gulf Coast Low Water Datum to mean lower low water; (6) introduces the tidal datum of mean higher high water in areas of predominantly diurnal tides; and (7) lowers mean high water in areas of predominantly diurnal tides. See chart datum.

National Geodetic Vertical Datum of 1929 [NGVD 1929]: A fixed reference adopted as a standard geodetic datum for elevations determined by leveling. The datum was derived for surveys from a general adjustment of the first-order leveling nets of both the United States and Canada. In the adjustment, mean sea level was held fixed as observed at 21 tide stations in the United States and 5 in Canada. The year indicates the time of the general adjustment. A synonym for Sea-level Datum of 1929. The geodetic datum is fixed and does not take into account the changing stands of sea level. Because there are many variables affecting sea level, and because the geodetic datum represents a best fit over a broad area, the relationship between the geodetic datum and local mean sea level is not consistent from one location to another in either time or space. For this reason, the National Geodetic Vertical Datum should not be confused with mean sea level. See North American Vertical Datum of 1988 (NAVD 1988).

North American Vertical Datum of 1988 [NAVD 1988]: A fixed reference for elevations determined by geodetic leveling. The datum was derived from a general adjustment of the first-order terrestrial leveling nets of the United States, Canada, and Mexico. In the adjustment, only the height of the primary tidal bench mark, referenced to

the International Great Lakes Datum of 1985 (IGLD 1985) local mean sea level height value, at Father Point, Rimouski, Quebec, Canada was held fixed, thus providing minimum constraint. NAVD 1988 and IGLD 1985 are identical. However, NAVD 1988 bench mark values are given in Helmert orthometric height units while IGLD 1985 values are in dynamic heights. See International Great Lakes Datum of 1985, National Geodetic Vertical Datum of 1929, and geopotential difference.

bench mark (BM): A fixed physical object or mark used as reference for a horizontal or vertical datum. A tidal bench mark is one near a tide station to which the tide staff and tidal datums are referred. A primary bench mark is the principal mark of a group of tidal bench marks to which the tide staff and tidal datums are referred.

For further information on tides, tidal predictions, tidal datums and related publications, contact:

NOAA, National Ocean Service
CO-OPS, Products and Services N/OPS3
Attn: User Services
1305 East-West Highway
Silver Spring, MD 20190-3281

(301) 713-2877 Ext. 176
Fax: (301) 713-4437